Reducing Phototherapy Without Increasing BIND

Ken Hempstead, M.D.
Tariq Chaudry, M.D.
Kristin Steuerle, M.D.
Dan Brugger, M.D.
The Permanente Medical Group

KAISER PERMANENTE® thrive

Disclosures

- Our speakers have no relevant financial relationships to disclose.
- We will not will not be discussing the unlabeled use of a commercial product during this presentation.

Acknowledgements

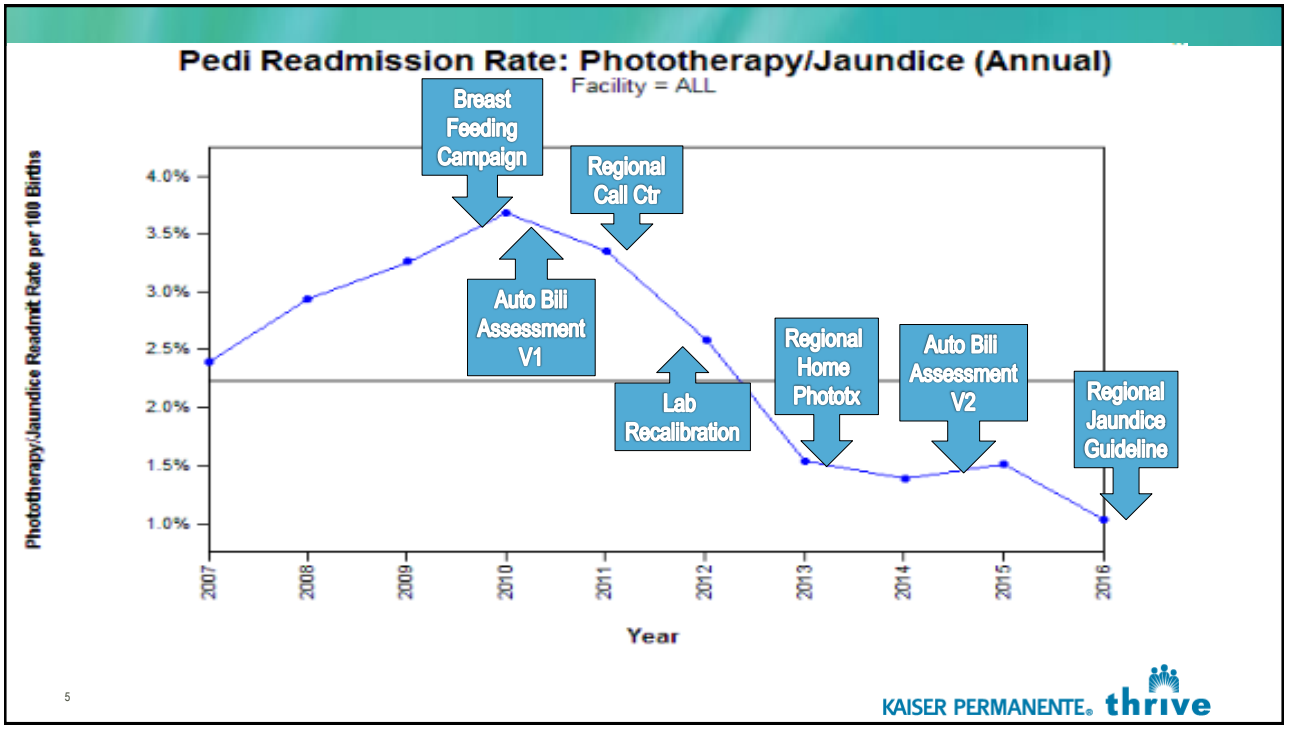
- A special thank you to all of the following other people who have made this presentation possible:

- Mike Kuzniewicz, MD, KPNC DOR
- Tom Newman, MD
- Allen Fischer, MD, KPNC Chief of Neonatology
- KPNC neonatologists, hospital pediatricians and outpatient pediatricians

Learning Objectives

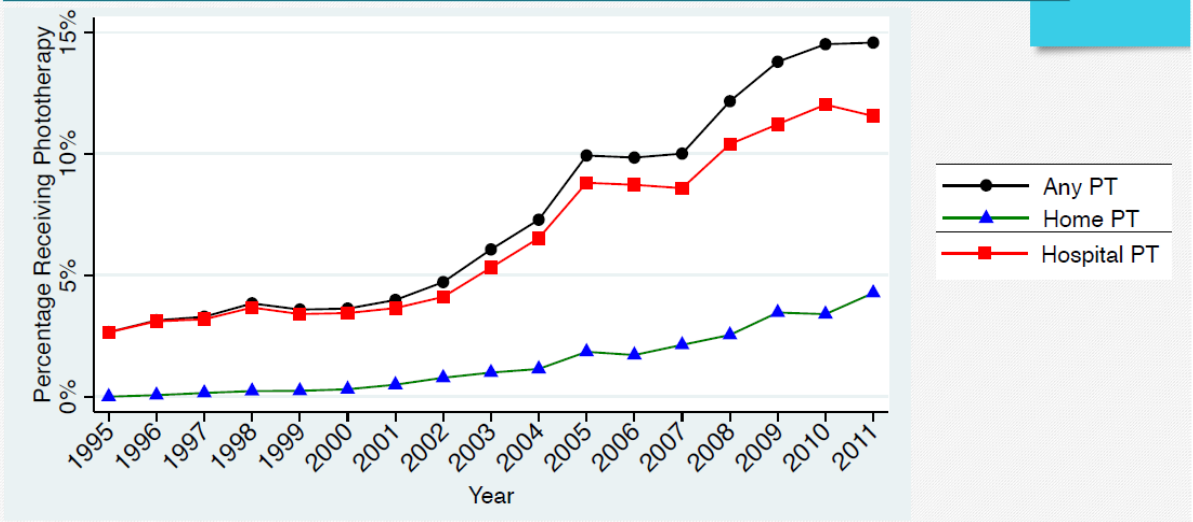
- Demonstrate concrete actions that YOU and your medical center can take to SAFELY reduce the use of phototherapy, especially readmissions
  - Check local lab assay
  - Increase support for feeding, especially exclusive breast feeding
  - Create Home Phototherapy Program
  - Design Safety Net
  - Create Guidelines
  - Standardize Clinical Practice around Guidelines
  - Re-measure and optimize

KAISER PERMANENTE® thrive



FIXING THE LAB ASSAY

Phototherapy Use in Kaiser Permanente Northern California



Kuzniewicz et al: http://jamanetwork.com/journals/jamapediatrics/fullarticle/2510875

Recalibrated neonatal bilirubin lab assay in May/June 2012:

- The post-recalibration period was associated with a **1.25 mg/dL decrease in mean maximum TSB**
- Phototherapy during birth hospitalization was **reduced by 59%**
- Readmissions for phototherapy **by 53%**

KAISER PERMANENTE® thrive

INCREASE AND IMPROVE FEEDING SUPPORT, ESPECIALLY FOR EXCLUSIVE BREASTFEEDING

Our Vision Across the Continuum

- KP NCAL will provide high quality and consistent lactation support to moms from pre-delivery through the first year so that they can successfully begin, continue, and enjoy their breastfeeding experience.
- Prenatal patients are supported with information and preparation to exclusively breastfeed upon delivery and onward.
- Patients in the hospital are supported to exclusively breastfeed.
- Post-delivery patients are supported to breastfeed through their baby's first year.

Background

Initial state:

- –Q1 2010: Looked closer at inpatient breastfeeding rates: Facility variation in PC-05 rates

  Lowest: 40% • Highest: 70% • Regional Average: 51%

- –Lack of outpatient data, no metrics

Barriers

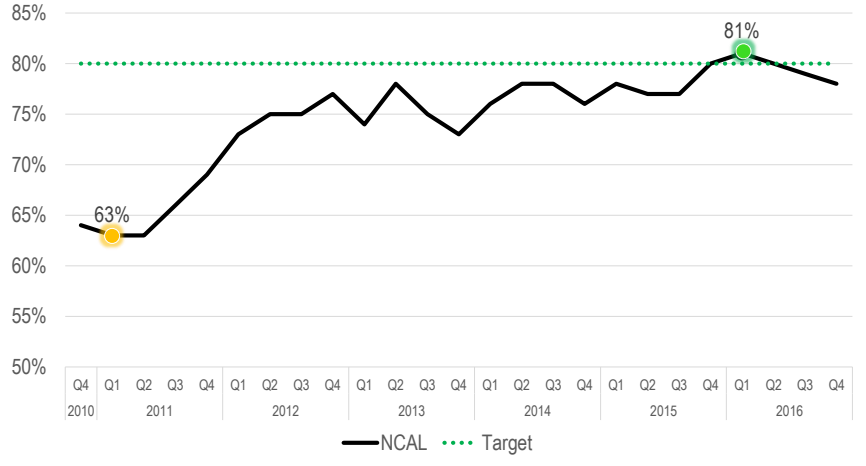
- Lack of support & prioritization from senior leadership
- Insufficient prenatal education for moms on the importance & benefits of breastfeeding
- Lack of breastfeeding-friendly maternity practices & policies in the hospital setting
- Inadequate preparation or education for clinicians to support mothers who wish to breastfeed
- Lack of easy access to lactation support outside of the hospital
- Limited communication between clinicians across healthcare settings
- Inconsistent quality of care across different settings

Solutions

- Leadership
- Education
- Metrics
- Collaboration
- Infrastructure

KAISER PERMANENTE® thrive

Regional Trends of PC-5 Breastfeeding Rates (2010-2016)



KAISER PERMANENTE® thrive

Results

- **In the Hospital:**
- **97%** of our newborns are breastfed
  - California (2015): **94%** [1]
  - Healthy People 2020 Target: **82%** [2]
- **79.5%** are **exclusively** breastfed
  - California (2015): **69%** [1]
  - Nation (2015): **52%** [3]
  - Regional goal: **80%**

1. California Department of Public Health, Hospital Totals Report 2015, 2. Office of Disease Prevention & Health Promotion, Healthy People 2020. 3. The Joint Commission Annual Report 2015

KAISER PERMANENTE® thrive

CREATING A PROGRAM FOR HOME PHOTOTHERAPY

Getting Started-Working with Home Health

- Identify and reach out to your local home health care company
- Take advantage of pre-existing workflows for ordering other durable medical equipment for home delivery in an urgent manner, such as for nebulizers
- Ensure enough high quality blankets are available
- Consider storage of a back up in a "DME Closet" in ED/Hospital
- Identify a liaison with the Home Health Company

Getting Started-Timing and Logistics

- Clarify optimum Lab sites (hours, turnaround time and quality)
- Clarify after hours/Holiday biliblanket ordering in advance
- Try to schedule newborn appointments in the mornings
- Ensure that simple written patient instructions are available
- Ensure that providers have simple, clear ordering instructions
- Confidence in these measures helps avoid frustration, and also helps avoid "prophylactic" (Under traditional AAP PTx. level) ordering of home phototherapy

Getting Started-Education

- Consider a Pilot to learn from and to boost confidence
- Consider sharing data on levels of bilirubin that cause BIND
- Emphasize the safety of these workflows if followed, but also risks if not followed

Guidelines for Home Phototherapy Use

- Always include evaluation of feeding and provide nutritional support
- Use appropriate tool to determine need for phototherapy
- Do not use “prophylactic” (below threshold) phototherapy

Guidelines for Home Phototherapy Use

Eligibility:

- Gestational age ≥ 37 weeks.
- Infants between 35.0 and 36.6 weeks GA may be eligible on an individual basis
- Infants less than 35.0 weeks GA are not eligible for HPT
- TSB at or below **2 mg/dl** above AAP traditional Phototherapy threshold.
  - For example, if traditional AAP Ptx threshold is 17, then up to 19 is ok for HPTx
  - Still covers majority of hyperbili babies, while staying safely away from BIND

Guidelines for Home Phototherapy use

Exclusions

- **Rh incompatibility**
- **Positive Coombs (DAT)**
- **Evidence of Hemolysis**
- **G6PD deficiency**
- **Any concerns for acute bilirubin encephalopathy**
- **Concerns about feeding, hydration, electrolytes**
- **Concern for adequate parental follow up**

Guidelines for Home Phototherapy use

- Close follow up and solid handoffs are critical
  - Typically babies on Home Phototherapy will have daily TSBs and daily office visits to assess feeding, etc.
  - Sign out to partners crucial to help ensure proper follow up occurs each day
  - Staff may need education of importance of follow up, in case parent calls in to cancel appt., or no-shows appt.

Guidelines for Home Phototherapy use

- Home phototherapy may be discontinued when there has been a 4-5 mg/dL drop in TSB or the absolute TSB level is ≤12 mg/dL
- Babies whose bili reaches more than 2 mg/dl above Ptx Threshold should be admitted for intensive phototherapy

Eliminating "Prophylactic" phototherapy

- Using these guidelines and gaining confidence in home phototherapy should help eliminate "prophylactic" phototherapy (treating below traditional AAP Phototherapy threshold)
- This is so important because there are such a large number of babies that fall close to, but not above, threshold levels. The number of babies needed to treat to avoid BIND skyrockets.

Other common pitfalls of a Home Phototherapy Program

- Delivery failures
  - Potential solutions:
    - Your Liaison to the Home Health Company does QA on any failures
    - Consider having your staff call the family to ensure delivery occurred
    - Being sure family has a number to reach the Home Health Company if no delivery as expected
    - Having a biliblanket in the ED/Hospital DME Closet as last resort

Other common pitfalls of a Home Phototherapy Program

- Family doesn't use blanket 24 hours a day
  - Potential Solutions:
    - Be sure to emphasize this in the simple written patient instructions
- Failure to follow up
  - Potential Solutions:
    - Educate your staff about importance of no-shows or parental attempts to cancel/delay follow up appointments
    - Always confirm a good current family phone number
    - Always have firm "handoffs" between providers

AUTOMATED BILIRUBIN ASSESSMENT

KP Practice Guideline Concerns

- The guideline expressed concerns that not all caregivers considered hyperbilirubinemia a potentially dangerous clinical process
- Physicians did not consider a newborn's exact age in hours when determining their risk
- There was failure to follow up on high bilirubin levels
- There was a wide variation in adherence to AAP phototherapy guidelines

Kuzniewicz et al. Impact of universal bilirubin screening in a managed care organization. (Accepted for publication, *Pediatrics*)

KAISER PERMANENTE® thrive

Problems With How We Evaluated and Managed Bilirubin

- Multiple steps / Inefficient
- Prone to human error
- Variable interpretation of the same data
- Not automatically documented
- Potentially missed
- Potentially over-treated

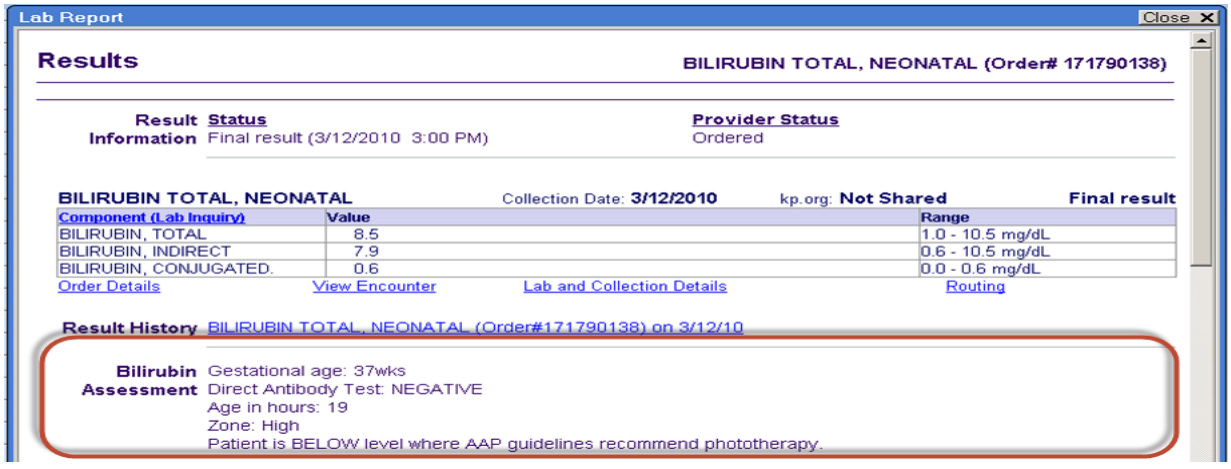
KAISER PERMANENTE® thrive

Create the automated bilirubin assessment tool

- The first version of an Automated Bilirubin Assessment (ABA) process was built into the EMR June, 2010
  - Automated determination of Bhutani risk and phototherapy recommendations
  - Through ABA and Best Practice Advisories, standardized recommendations for treatment and follow-up

KAISER PERMANENTE® thrive

INITIAL ABA REPORT JUNE, 2010


Lab Report

Close

Results

BILIRUBIN TOTAL, NEONATAL (Order# 171790138)

Result Information **Status** Final result (3/12/2010 3:00 PM)

Provider Status Ordered

BILIRUBIN TOTAL, NEONATAL Collection Date: **3/12/2010** kp.org: **Not Shared** **Final result**

Component (Lab Inquiry)	Value	Range
BILIRUBIN, TOTAL	8.5	1.0 - 10.5 mg/dL
BILIRUBIN, INDIRECT	7.9	0.6 - 10.5 mg/dL
BILIRUBIN, CONJUGATED.	0.6	0.0 - 0.6 mg/dL

Order Details | View Encounter | Lab and Collection Details | Routing

Result History BILIRUBIN TOTAL, NEONATAL (Order#171790138) on 3/12/10

Bilirubin Assessment Gestational age: 37wks
Direct Antibody Test: NEGATIVE
Age in hours: 19
Zone: High
Patient is BELOW level where AAP guidelines recommend phototherapy.

KAISER PERMANENTE® thrive

CALL CENTER SAFETY NET

BILIRUBIN SAFETY NET – May 2011

- Call center report created daily to identify babies who have not been "actively managed"
  - No phototherapy when ABA indicates need
  - No repeat bilirubin within recommended follow-up interval
- Call center RN chart review triggered to determine if intervention required (e.g. message to responsible provider)

Bilirubin Follow-Up Report (10/13/2011)

BILLIRUBIN FOLLOW-UP REPORT

Possible Lost to Follow-Up

LOCATION	MRN	SPECIMN_TAKEN_TIME	TBL
OAK	15	10/11/2011 11:37:00	18.20
SSC	15	10/10/2011 4:20:00	13.50
DRV	15	10/9/2011 8:51:00 A	14.70
HAY	15	10/11/2011 10:23:00	17.70
RWC	15	10/11/2011 3:45:00	18.80
PLS	15	10/11/2011 11:17:00	17.80
PLS	15	10/11/2011 10:30:00	17.10
SCH	19	10/7/2011 9:09:00 A	14.20
RWC	19	10/11/2011 8:42:00	19.80
RCO	19	10/11/2011 10:47:00	14.00

Possible Need for Phototherapy

LOCATION	MRN	SPECIMN_TAKEN_TIME	TBL
HAY	15	10/12/2011 10:26:00	16.30
OAK	19	10/12/2011 9:04:00	18.00
FOL	19	10/12/2011 11:13:00	18.20
ROS	19	10/12/2011 10:43:00	18.60
FOL	19	10/12/2011 11:57:00	18.70

KAISER PERMANENTE® thrive

ENHANCED ABA REPORT JUNE, 2014

Bilirubin Assessment

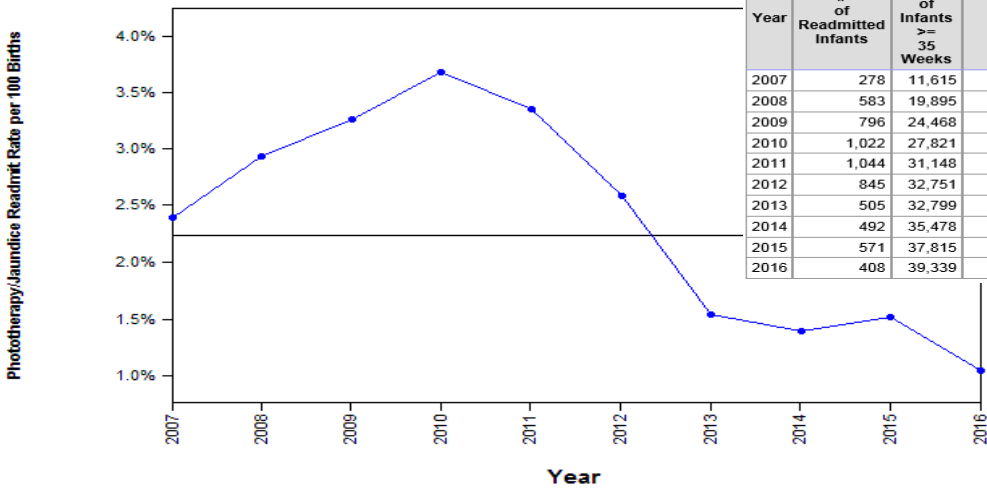
Maternal Blood Type:	O NEG
Maternal AB Screen:	Positive
Gestational Age:	40 weeks
Infant Blood Type:	O POS
Direct Antibody Test:	Positive
Age:	98 hours
Risk Zone:	High
Phototherapy Threshold:	17.33 mg/dL

Patient is WELL ABOVE the level where AAP guidelines recommend phototherapy.

KAISER PERMANENTE® thrive

THE RESULTS

Region: Jaundice Readmission



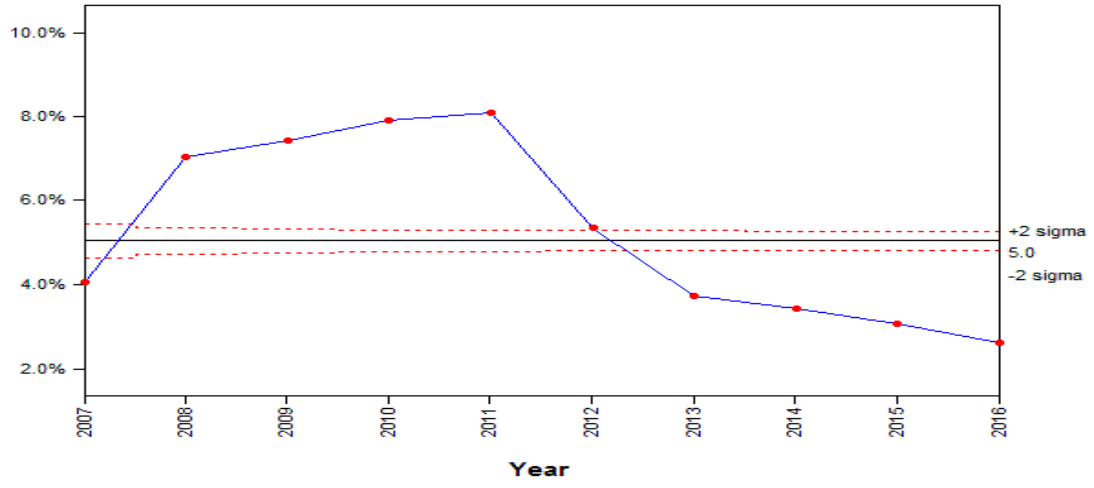
Year	# of Readmitted Infants	Total Number of Infants >= 35 Weeks	Phototherapy/Jaundice Readmit Rate per 100 Births
2007	278	11,615	2.4%
2008	583	19,895	2.9%
2009	796	24,468	3.3%
2010	1,022	27,821	3.7%
2011	1,044	31,148	3.4%
2012	845	32,751	2.6%
2013	505	32,799	1.5%
2014	492	35,478	1.4%
2015	571	37,815	1.5%
2016	408	39,339	1.0%

Facility: Jaundice Readmission

Facility	Quality Status	SPC Chart + -	# of Readmitted Infants	Total Number of Infants >= 35 Weeks	Phototherapy/Jaundice Readmit Rate per 100 Births
	✓		20	1,643	1.2%
	✓		25	1,425	1.8%
	✓		36	2,980	1.2%
	✓		13	2,305	0.6%
	✓		13	1,848	0.7%
	★		14	5,543	0.3%
	✓		29	2,771	1.0%
	✓		24	2,398	1.0%
	✗		66	3,575	1.8%
	✓		37	4,350	0.9%
	✓		21	2,033	1.0%
	✓		34	2,646	1.3%
	✓		16	1,232	1.3%
	✗		38	1,544	2.5%
	✓		22	3,046	0.7%
			408	39,339	1.0%

KAISER PERMANENTE® thrive

Region: % of Patients > 35 weeks Gestation Receiving Phototherapy prior to Discharge



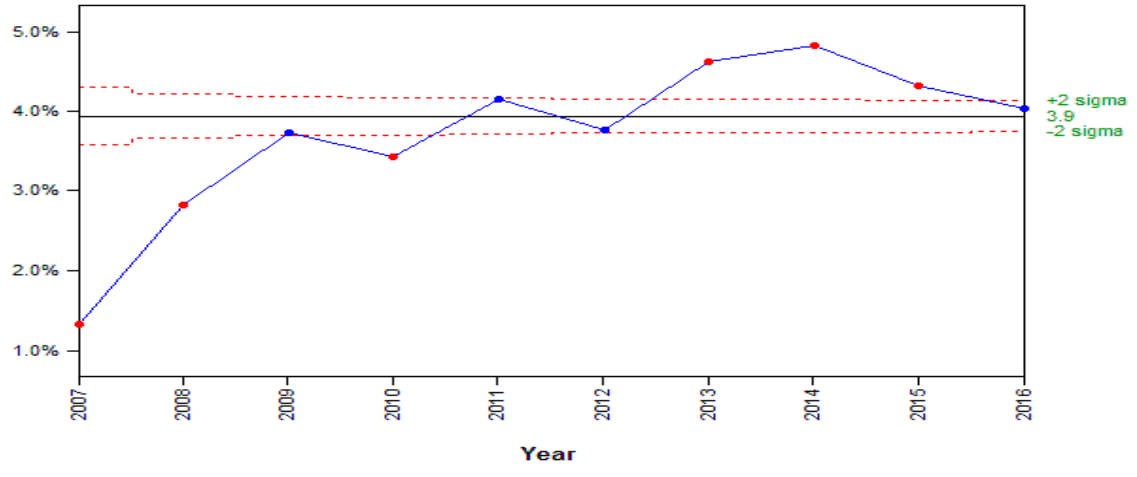
KAISER PERMANENTE® thrive

Facility: % of Patients > 35 weeks Gestation Receiving Phototherapy prior to Discharge

Facility	Number of Inpatient Phototherapy Patients	Total Number of Inpatient Infants Born >35 Weeks	Percent
	89	1,425	6.2%
	135	2,980	4.5%
	116	3,046	3.8%
	54	1,545	3.5%
	58	1,848	3.1%
	50	1,643	3.0%
	75	2,646	2.8%
	69	2,768	2.5%
	85	3,575	2.4%
	50	2,399	2.1%
	40	2,033	2.0%
	106	5,543	1.9%
	20	1,232	1.6%
	57	4,350	1.3%
	22	2,305	1.0%
Overall	1,026	39,338	2.6%

KAISER PERMANENTE® thrive

Region: % of Patients > 35 weeks Gestation Receiving Home Phototherapy



KAISER PERMANENTE® thrive

Facility: % of Patients > 35 weeks Gestation Receiving Home Phototherapy

Facility	Number of Inpatient Phototherapy Patients	Total Number of Inpatient Infants Born >35 Weeks	Percent
	89	1,425	6.2%
	135	2,980	4.5%
	116	3,046	3.8%
	54	1,545	3.5%
	58	1,848	3.1%
	50	1,643	3.0%
	75	2,646	2.8%
	69	2,768	2.5%
	85	3,575	2.4%
	50	2,399	2.1%
	40	2,033	2.0%
	106	5,543	1.9%
	20	1,232	1.6%
	57	4,350	1.3%
	22	2,305	1.0%
Overall	1,026	39,338	2.6%

Items Left to Achieve

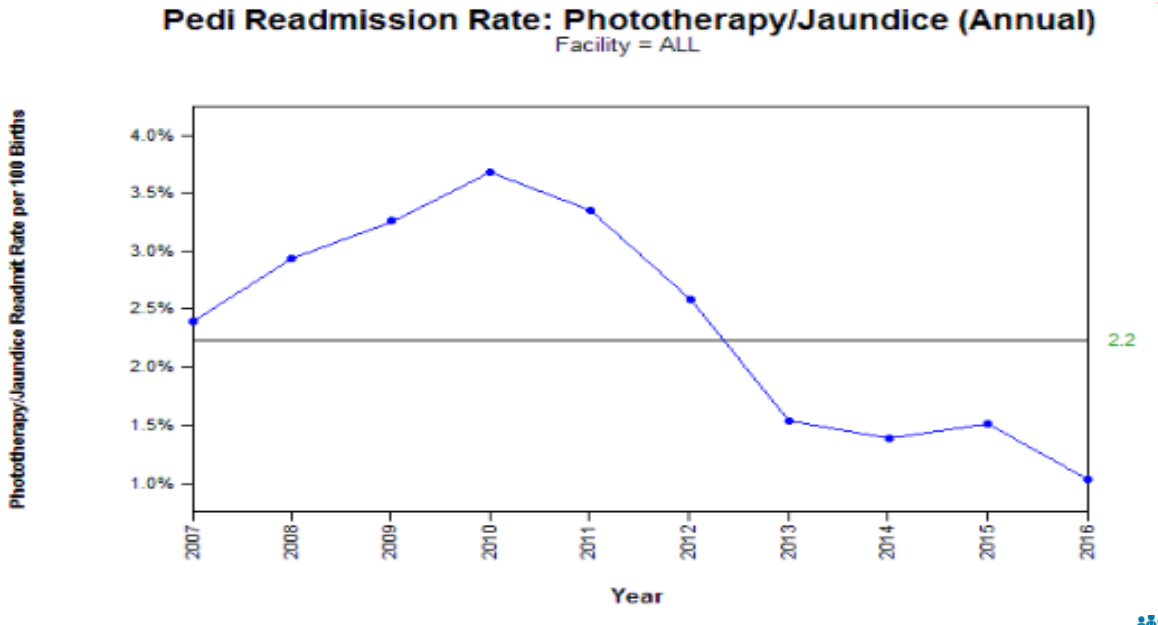
- Address phototherapy overuse for patients under threshold
  - Inpatient
  - Home
- Continue education on actual total bilirubin level needed to see BIND
- Continue to track data and maintain quality improvement

KAISER PERMANENTE® thrive

Keys to Program Implementation at Large Scale

- Align stakeholders around a vision
- Present the problem with accurate data
- Create a future state
  - We will maximize patient safety and quality while minimizing inpatient readmission
  - Support breast feeding and family experience
- Create Structured Plan
- Follow up and Course Correct as needed

KAISER PERMANENTE® thrive



KAISER PERMANENTE® thrive

Safety Outcomes

- KPNC Has not had a bilirubin > 30 mg/dL since 2011
- No BIND or Kernicterus is believed to occur below 30 mg/dL
- Indeed KPNC has not had a case of Kernicterus since 2011

Kuzniewicz et al Pediatrics, 2014
Gamaledin et al. Pediatrics, 2011
Ebbesen et al. Acta Paediatrica, 2012

Questions?